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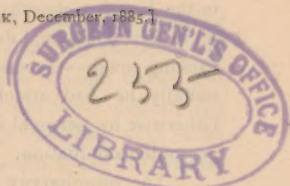
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TOTAL EXTIRPATION OF THE LARYNX.

BY ROSWELL PARK, M. D.





A CASE OF TOTAL EXTIRPATION OF THE LARYNX. *

BY ROSWELL PARK, M. D.

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Gentlemen: The case I have to show you here is one of such interest that, while but very few of you had the opportunity of witnessing the operation, I cannot forego the chance of showing you its results so kindly permitted me by the patient, who is himself a physician and who was until very recently in active practice in an adjoining state.

But that you may better understand his condition previous to operation I have begged my friend, Dr. F. W. Hinkel, under whose care he had been, to give you a short account of the case as he had watched it. This he courteously furnishes as follows:

"Dr. J. H. Pierce was brought to my office for examination October 9, 1884, by Dr. H. R. Hopkins. His voice was shrill, discordant, and very stridulous. He gave his age as sixty-three years. He had the appearance of rugged health, but stated that while a youth he had been "sent away to die of phthisis." After his graduation in medicine he developed perfect general health, which he had since retained, in spite of much abuse in civil and military life, and by excessive smoking. Said he had used as many as twenty cigars a day. He dated his throat trouble from an attack of acute laryngitis after great exposure in the early years of our civil war. Since then, has been annoyed by occasional attacks of hoarseness and sore throat, which gradually became more frequent, continuous and severe until,

* Part of a Clinical Lecture delivered at the General Hospital October 3, 1885.

in the last few months, his voice had fallen into its present condition. Lately there were occasional darting pains through the region of the larynx. He had a hacking cough—especially at night—with little expectoration and no pain. Occasionally he had attacks of dyspnoea, which he termed “asthmatic attacks.” Otherwise his personal and family history were good. He had never had a laryngoscopic examination.

“The oro-pharynx was found unusually small in proportion to size of patient, much inflamed and extremely irritable. The arches of the palate were swollen and red. The uvula was of a purplish-red color, much thickened and covered with corrugated mucous membrane, but not oedematous nor elongated. The laryngoscopic examination was made with difficulty, owing to excessive faucial irritability. It revealed deep congestion and puffiness of the mucous membrane in the supra-glottic portion of the larynx. The ventricular bands were swollen, deep red in color, and not clearly defined. The location of the vocal bands was filled with two reddish-grey, irregular, sessile growths, apparently filling the ventricles on either side and covering both vocal bands. By careful examination they could be seen to extend on each side over the lateral walls of the sub-glottic portion of the larynx, so that the bulk of the growth was sub-glottic. The glottis was much and irregularly encroached upon. A tooth-like process from the posterior third of the right growth, and a similar process from the anterior portion of the left growth, transformed the chink into an irregular Z-shaped opening. The sub-glottic larynx was irregularly contracted in its lateral dimensions, rendering it impossible to see beyond the growths. The further encroachment upon this small breathing space by the swelling incident to acute congestion readily explains the ‘asthma’ from which he suffered at times. There was no ulceration present. The cushion of the epiglottis was swollen, but probing did not show marked tenderness over it or the growths. These latter I regarded as papillomata, but feared there was beginning epitheliomatous degeneration. Believing their complete removal *per orem* to be impossible, I made use of soothing alterative applications, and warned the patient of the great possibility of malignant degeneration at his age, and of the possible future advisability of thyrotomy or even extirpation of the larynx.

“After a few days he disappeared suddenly from my observation. He came under my care again for a few days on January 8, 1885. He had been under Dr. Elsberg’s care, in New York, in the interim. The condition and appearance of his throat were much the same as when first examined. On April 20 I saw him again. He stated there had been some operative procedures by Dr. Elsberg. Owing to the unfortunate death of that eminent laryngologist it has been impossible to obtain, with any exactness, his prognosis or treatment of the case. An examination showed but little change in the growths, and that for the worse, the glottis being smaller and the growths more redundant. The patient was suffering at the time from a severe pharyngitis. The uvula was much inflamed, and dyspnoea was quite marked. Under treatment this disappeared, and the patient with it.

"I again saw him on June 10. In the interval he had visited Philadelphia and was there seen by Drs. Seiler, J. Solis Cohen, and others. His condition was now changed much for the worse. There were darting pains through larynx and into left ear. Voice was gone completely. His breathing was noisy, difficult and hurried. Pulse rapid and weak. Sleep was disturbed, and had often to be taken sitting up, on account of sudden attacks of dyspnoea. He was losing his strength and spirits. The left ventricular band presented, on its anterior third, a smooth, rounded tumor, of deep red color and considerable density, shading into the surrounding congested mucous membrane. The growths over the vocal bands had increased somewhat in size, but were not ulcerated. There was exquisite sensitiveness over the cushion of the epiglottis and over the new formation in the ventricular band, when probed. The case being now plainly one of epithelioma, I seriously broached to him thyrotomy, or extirpation of the larynx, as the only means of relief from the disease, and explained that tracheotomy might be rendered necessary by the slightest diminution of his air-space by inflammatory swelling. Some indiscretion on his part precipitated an acute congestion of his larynx, and on the morning of June 14 I found him in my office, laboring for breath, weak, excited and somewhat cyanosed, after a sleepless night spent in a struggle for life. Finding tracheotomy necessary at once, I hurried him home and called in Dr. Roswell Park, who met me that afternoon at the patient's temporary residence."

The patient was in the condition described by Dr. Hinkel, when I first saw him. As he was in danger of immediate suffocation there was no difference of opinion as to the immediate necessity for tracheotomy. This was consented to, and at once performed. So little breathing space was there that we even feared to give an anæsthetic; we therefore urged that it be borne without. A syringe full of cocaine, four per cent. solution, was injected under the skin in the middle line of the neck, and the ether spray used as a local anæsthetic. With Dr. Hinkel's kind assistance I then began to operate. But pain was by no means abolished, and on this account the procedure was prolonged. Finally, after dissection was partly accomplished, and the deep parts so far exposed that, in case of necessity, the trachea could be roughly and quickly opened, the patient's demand for chloroform was acceded to, and it was carefully administered.

No small difficulty was experienced in properly exposing the trachea, and the operation was, hence, annoyingly prolonged. Even after its exposure the proper introduction of the tracheal tube was rendered very difficult; and the introduction of wire sutures through

skin edges and the margins of the tracheal opening, as I had contemplated, was impossible. Full anatomical explanation of these difficulties was furnished by the subsequent operation, which showed that the trachea not only lay at an unusual depth, but had undergone a considerable calcification (senile) by which it had lost most of its elasticity.

But the tracheal tube was finally introduced, and the patient breathed easier than he had for a long time. Relief was immediate, and in two days he was up and about his room and had recovered from the physical exhaustion of his partial apnoea.

During the latter part of the first week there was a mild amount of nocturnal delirium, which we were then inclined to ascribe to the influence of opiates, but which, in the light of subsequent developments, we had to consider traumatic in origin.

The tracheotomy wound granulated so rapidly that in the absence of sutures the tube could not be kept in place, but was crowded up and out by the healing process. But the more or less inflamed and tortured larynx, even though filled up with growth as it was, had had a week's rest, and after the removal of the tube he breathed with considerable ease.

Now the question of "what next?" assumed no small proportions. It was a choice between sure death from extension of the trouble, or not improbable death from the results of a radical operation. For the latter, spoke the excellent physical condition and powers of endurance of the patient, and the facts that no cancerous cachexia was to be noted, and that there was no sign of any involvement of parts outside the laryngeal box. Against it, spoke only the known dangers of the operation. Our advice was in favor of operation, and this was also the advice of Dr. Carl Seiler, of Philadelphia, who saw him while on a trip to the West. The patient made his choice of radical operation, after a full presentation of its advantages and dangers.

Accordingly, he took a private room in the Buffalo General Hospital, where he was prepared for operation. On June 28, 1885, complete extirpation of the larynx was performed. During it I had the valuable assistance of Dr. Phelps, who kindly took charge of the anæsthetic (chloroform with 1% of amyl nitrite), of Dr. Seiler

and Dr. Hinkel, who assisted in the operative procedures, and of several of my colleagues of the hospital staff. The operation was made, in the presence of a number of medical gentlemen of the city, in the hospital amphitheater, where there is remarkably good light.

It was necessary to make a long incision, in the middle line, which ran from a little in front of the body of the hyoid to one inch below the upper end of the sternum; this, as the head was drawn backwards over pillows, made it about six inches long. In it were included the remains of the previous tracheotomy incision. Careful dissection was then made down on either side of the larynx and trachea; the muscles attached to the sides of the larynx were peeled back with a sharp periosteum elevator. This separation of soft parts on either side was carried as high as the hyoid bone and as low as the second or third rings of the trachea. Vessels were caught in hæmostatic forceps fast as they bled, and tied later with catgut; a few larger veins were tied twice and cut between ligatures; about twenty-five hæmostatic forceps were employed, once or twice all being in use at the same time. Up to this time patient had breathed his chloroformized air by the mouth. At this time, after the deep parts had been well exposed, and the lateral portions held aside with retractors, and after my fingers had pretty completely separated the trachea from the œsophagus, it was thought best to open the thyroid cartilage for exploratory purposes. This was no easy task, and sharp cutting bone forceps were necessary before it could be accomplished, so firmly was it calcified. By this exploration it was quickly noted that the growth was well confined within the laryngeal walls. So without further loss of time the trachea was divided; first longitudinally through its upper three rings, and then transversely between the first and second ring. A Trendelenberg tampon tracheal canula was then inserted, but its rubber balloon proved faulty; consequently, I packed sponge around its main tube and used it as an ordinary tracheal tube, save that the tube and funnel for the anæsthetic connected with it were utilized during a part of the remaining time.

The larynx and upper tracheal ring were now rapidly separated from the œsophagus, and after this separation was complete from below the thyro-hyoid membrane was divided and then the re-

mainder of the lateral walls of the lower pharynx, the constrictors were dissected off from their insertions into the larynx, and the whole removed in one piece. Hemorrhage was checked, and then the parts explored for evidences of any extra-laryngeal suspicious tissue. None was found here, but I decided to remove the uvula, which had been for some time very sensitive, and in which a little firm nodule was felt. The upper part of the epiglottis, with its glossal and lateral connections, was also left *in situ*.

Particular attention was then given to every bleeding point, and hemorrhage, which had at no time been alarming or uncontrollable, was perfectly checked. A little blood had run down the trachea and was coughed up at intervals. The tracheal tube was then removed and a strong silk suture introduced on either side, through the skin and the upper tracheal ring which, it will be remembered, had been split vertically. These were the only sutures used, and were for the purpose, not of trying to pull the trachea up in the neck, but simply of holding it well to the front. A large single trachea tube of aluminum, made for the purpose, was then introduced and held by tapes around the neck. Over its upper surface fell the anterior-cut margin of the œsophagus. Iodoform was dusted sparingly throughout the wound and the whole cavity carefully packed with iodoform gauze, so arranged that a pathway to the œsophagus was left, this latter being lightly plugged with the same material.

This ended the operation, which lasted just about one hour. Dr. Phelps so carefully gave the anæsthetic that not once during its whole course did the patient's pulse flag. Once or twice his breathing was disturbed, but apparently only by the presence of blood in the bronchi, and which was speedily expectorated. Shock was very slight. He was put to bed with hot bottles, and the temperature of the room ordered to be kept at 80° F. Five hours after the operation, finding that he had not vomited at all, and as he wrote me he was feeling somewhat faint, I introduced a soft rubber œsophageal tube through the wound and through a funnel poured a half-pint of strong egg-nog into the stomach. His temperature was then 101.8°, pulse 138 and respiration 40.

In this way he was fed every four to six hours, the nourishment being concentrated but fluid, at first mostly a mixture of Reed and

Carnrick's beef peptonoids in egg-nog. Quinine in good tonic doses was given, as also, later, fluid extract of coca and tincture of nux vomica; also hypnotics as needed, codeia being the only opiate employed and this sparingly. Not until the third day was the iodoform gauze touched, and it was not entirely removed until the sixth. It was replaced by fresh gauze or iodoform cotton. After the second day, when surgical fever had subsided, his temperature averaged 99° , and was often normal.

Convalescence was only broken by one incident, but this came near being disastrous. On the fifth and sixth days it was noticed that he seemed a little dazed, and his written messages were somewhat incoherent; and I was reminded of his similar condition after his previous operation. Late in the evening of the sixth day, while apparently asleep, and being watched by one pupil of the training school for nurses, he suddenly jumped out of bed, threw up a window (second story) and made ready for a spring. The nurse seized him by his night-clothes and pulled him back. Then ensued a severe struggle, during which she was severely bruised, he endeavoring to escape and she to hold him back; in a moment her calls for assistance were answered and he was put back in bed. But for her pluck he would have killed himself by his attempted leap. His acute mania was soon subdued. Next morning his temperature was only 99° , and he showed no evidences of his wild night, save that his thoughts were incoherent. In two days he had practically recovered, though his mind was not quite clear for two weeks afterward. This could not have been iodoform intoxication nor the effects of opium, because both had been used in minimum amounts; I therefore class it among those obscure cases of so-called "traumatic mania," about whose etiology we know practically nothing.

I soon began, however, to dress his wound with cotton steeped in a saturated solution of salicylic acid and potassium chlorate, and to the stimulating effect of the latter I ascribe the remarkably rapid granulating process by which the wound closed.

Three weeks after the operation he rode a mile to his brother's house, having had not the slightest septic symptom, nor any untoward lung complication; in fact, the mania was the only incident of his subsequent recovery. In three weeks and a half the œsophageal

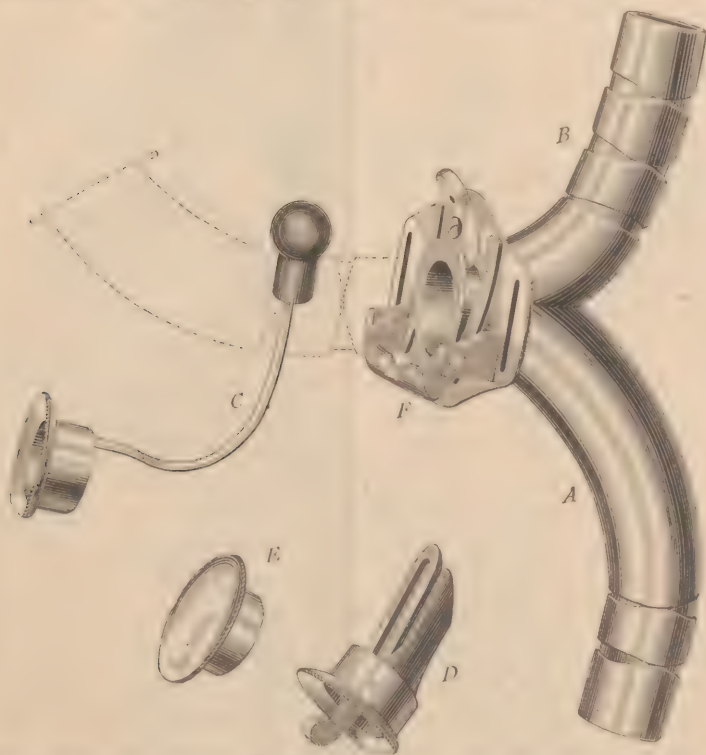
feeding tube was introduced through the mouth instead of by the wound, which was no longer sufficiently open. In five weeks he was wearing the tracheal portion of his artificial larynx; in six weeks the pharyngeal portion of it, was breathing through his nose once more, and was able to whisper so that he could be heard across the room. In seven weeks he was able to swallow soft solids, when the obturator of the upper tube was introduced. In eight weeks he was able, by means of the vibrating reed inserted in the tubes, to talk almost as loudly as you or I, and to articulate with perfect distinctness. And by a process of self-education combined with a certain self-reliance he has been able to learn to a certain extent to swallow ordinary food, and to drink, even without the obturator, he having acquired the knack of protecting the open upper end of the pharyngeal tube by the remainder of the epiglottis.

This operation has not yet been performed, all told, a hundred times; and in this country, but two or three times previously to this case. As nearly as I can gather, never have the processes of repair occurred with greater rapidity than here; in fact, as I recall the formidable wound, it seems almost incredible that healing could have taken place as rapidly as it did. Now as you see the patient, only fourteen weeks after operation, you observe only an opening barely admitting a finger tip, and which has had its present size for eight weeks. Through this small opening are introduced the various portions of this most ingenious mechanism known as Gussenbauer's artificial larynx, which it yet remains for me to demonstrate to you.

The one which the patient is wearing is made of pure silver and was made for him by Mr. A. M. Edwards, of this city, an ingenious and skillful jeweler. It was fashioned after this other one, whose parts I now show you, which was made for me by the same artisan in Prague who has made all of Prof. Gussenbauer's later instruments.

It consists of a tracheal tube of large size (*A*) with rings at its lower end permitting a slight motion, corresponding to the natural flexibility of the trachea. Through its front plate and through an opening on its upper curvature passes a second or pharyngeal tube (*B*), made also flexible (or not, according to the case); with an opening on its lower curved surface, so placed that a stream of air

may play freely through both tubes, even though the external outlet be closed. The upper end of the pharyngeal tube lodges behind and below the epiglottis, if this have been left *in situ*, or behind and below the base of the tongue, as the case may be. Around it the œsophagus granulates and closes, so that after the



healing process is complete the only passage from the pharynx into the larynx is by way of the metal tube. In order that fluids and solids may not pass through this, an obturator (*C*) is provided, which is passed through the external opening and up through the tube, so that its rounded upper end plugs the upper end of the pharyngeal opening, thus preventing passage of anything into the trachea. But since this would also shut off air, the obturator is attached below, not to a solid plug, but to a ring, as seen, which fits accurately into the external opening of the instrument, through

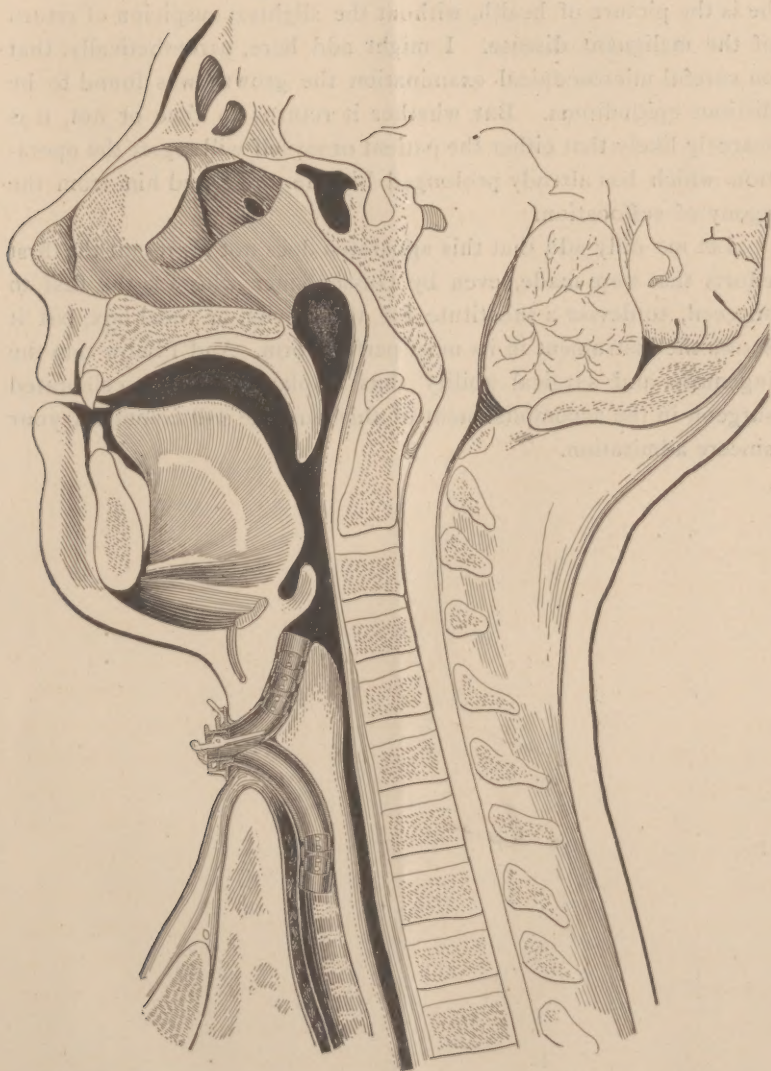
which, then, the patient breathes so long as this plug is worn. Except at meal times this simple stopper (*E*) is worn, so that at all other times he breathes naturally through the nose and mouth. After a time, by an instinctive education of the pharyngeal and buccal muscles, the upper end of the tube is protected during the process of deglutition, and patients wearing these instruments learn to swallow readily without the assistance of the obturator. Even thus soon, in this particular case, you see the patient unconsciously but easily swallows his saliva.

Now the feature of greatest interest about this apparatus is the vocal part. Let this case forcibly remind you that the vocal cords do nothing in articulate speech but furnish the tone or sound, and that articulation is all carried on by parts above the larynx. With only the simple stopper in place, by aid of which the air current is directed toward the mouth, the patient will read to you in a loud or 'stage' whisper which is distinctly audible all over this large room, and you realize how perfect his articulation is. Now you can understand how we may get a distinct speaking voice providing we can introduce some substitute for the vocal cords, something which, by vibrating in the air current, may produce a distinct *tone*.

And in this simple mechanism (*D*) we have such substitute. Only a free metallic reed, like a melodeon reed, playing freely in a movable slotted bar, and fitted inside of a stopper like the other one. This movable bar carrying the reed has an external lever, by means of which the wearer is enabled, with a touch of his finger, to throw it into or out of the air current, and thus—as it were—to voluntarily open or close his glottis. Placing this part of the instrument *in situ*, and throwing the reed into the air current, the metal strip vibrates as it does in the jew's-harp, and the sound thus produced is converted, by the articulating parts above, into something more than the whisper you heard before,—into *distinct speech*.

To be sure his 'voice' is now a monotone, but it is nevertheless a voice, and he is just as capable of carrying on a conversation as you or I.

We may regard, then, the results of the operative and subsequent procedures in this case as perfectly successful, and as justifying such radical measures in selected cases. As you see the patient to-day



[This figure, modified from one of Schüller's, represents the instrument *in situ*. The artist's notions of topographical anatomy have led to some distortion of the anatomical relations, but without interference with the main purpose of the illustration.]

he is the picture of health, without the slightest suspicion of return of the malignant disease. I might add here, parenthetically, that on careful microscopical examination the growth was found to be distinct epithelioma. But whether it returns in time or not, it is scarcely likely that either the patient or myself will regret the operation which has already prolonged his life and saved him from the agony of suffocation.

Let me only add that this apparatus does not represent the first efforts that were made, even by Gussenbauer who was the first to succeed, to devise a substitute for the larynx, or vocal box, but it shows the instrument in its most perfect form. And I know that the ingenuity and surgical ability thus displayed by that celebrated surgeon in the accomplishment of this purpose will command your sincere admiration.

